LETTERS TO THE EDITOR.

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The Mobilisation of Science.

THE article in NATURE of June 17 expresses forcibly what many men of science are thinking. The strange part of the matter is that the Government and the country generally do not share in these thoughts and do not take action by insisting on scientific men taking on themselves their share of the common burden. The general disregard of science is, of course, the fault of scientific men, and particularly of the Royal Society, but limitations of space do not permit me to enter upon that fascinating theme here and now. The point to be dealt with is: What is to be done now? NATURE says, on p. 419, that what is required is "the appointment of a National Committee with a free hand and ample funds for experimental work"; and that "we should possess a scientific corps, with men investigating at the Front as well as at home, instead of one or two committees advising officials as to possible means of offence or defence."

Mr. H. G. Wells, in his letters to the *Times*, seems to show that he holds the same views. Now, with all due respect to NATURE and to Mr. Wells, those methods are not in accord with our national characteristics, and are not suited to the needs of the moment. To be plain, they are counsels of perfection with the practical defects usually associated with such counsels.

Progress in our country, if not throughout the world, comes mainly, not from scientific discovery, but from its application. It is beside the mark to point out that without the researches of scientific men, the results could not be applied in practice. The advance of science is a blindfold march. No man knows whither it will lead, or what landmark may be reached even by the next step. This is not to say that each step is not carefully considered beforehand and its probable landing-place made the subject of the most earnest and profound thought. But it is to say that each step is only the preliminary to another step, and that science cares little about landmarks. The good scientific investigator is not concerned as to the immediate value of his work. He is in pursuit of truth. Let the world benefit by the way he has opened out if it is sufficiently wise. The imprisoned splendour has blazed forth. Let others work by its light.

This is precisely what the inventor does. He is not greatly interested in the splendour, but he is very much interested if he can see his way to making use of it in something "practical." He is often not particularly scientific, or at any rate has little scientific reputation. Yet a man who can apply science is in his way as useful to science as science is to him. Just now it is the applications of science we want, not the underlying science itself. We want to stimulate invention, to get hold of the men with a "practical" turn, and induce them to do their best. How is it to be done?

To find the answer, the question must be considered a little further. The main thing with an inventor—the applier of science—is to know for certain of some competent person who will listen to what he has to say, who can judge of the value of what is said, and will not rob him of his ideas. The inventor wants the credit for his own work, and if he often positively prefers something more tangible, he may perhaps be forgiven in a world where success is nearly always measured in one way. But does an inventor like to approach the Government? Of course, the man with superb self-confidence will do the most unlikely things. I will content myself with saying that many inventors would not do so. At this juncture some men at least are convinced, rightly or wrongly, that they would not receive a patient and intelligent hearing. It is impossible for the average Briton to get into his head that an official can be anything but stupid, incapable, and lazy, with a rooted objection to new ideas, especially if, as is probable, he does not fully understand them.

The method for the Government to adopt is to let it be known that the hearing will be patient and intelligent, and the adoption of new ideas immediate, if they are to be adopted at all. It is useless to set up Advisory Committees if they do not command the confidence of the men who have the knack of applying science. Possibly—I say it with bated breath—even the council of the Royal Society might not be the best Advisory Committee. Perhaps an admixture of more mundane material, even men from works who live by applying science, might be to the good. But at least it must be made clear to all by the widest publicity that the Committee is not one of officials, whose attainments are chiefly in directions other than science.

To me it seems that the various scientific and technical societies are enough, that any electrician would trust the council of the Institution of Electrical Engineers, that any chemist would trust the councils of the Chemical Society and the Society of Chemical Industry, that any metallurgist would trust the councils of the Iron and Steel Institute, the Institution of Mining and Metallurgy, and the Institute of Metals, and so on. These organisations are already in existence and consist of the mixture of men of the laboratory and of the works which would possibly give the best results.

The setting of men to work, whether at the Front or at home, in directions specified by the Committees is a matter which I have not touched, but this letter is already too long.

T. K. ROSE
(President).

Institution of Mining and Metallurgy, June 19.

The Magnetic Storm and Solar Disturbance of June 17, 1915.

THE greatest magnetic disturbance of the present cycle of sun-spot activity, which commenced in March, 1914, and the most violent since that of September 25, 1909, occurred on June 17, 1915. It commenced G.M.T. 1.50 a.m. with a sudden increase of H.F., and a corresponding sharp, though slight, movement of the declination needle towards the west. The greatest angular range in declination was 91·5′ of arc, which occurred at 6 p.m. The spot of light on the recording drum of the H.F. gradually swung downwards with decreasing force, until at 7.35 a.m. it passed beyond the limits of record, and remained off for thirty-seven minutes. It then returned for a moment, when a further sharp decrease took it beyond the limits of record until 11.30 a.m. Then with a succession of oscillations it increased, attaining a maximum of angular displacement of 100′ at 4.15 p.m. ($1' = 0{\cdot}44 \times 10^{-5}$ C.G.S. units). The total range exceeded 130′. The V.F. also attained its maximum value of increasing force at 4.15 p.m. In all the elements the disturbance was most intense between 4 and 6 p.m., although it did not exhibit any of the very rapid oscillations sometimes characteristic of such movements. A second phase, or repetition of the storm, consisted, as so often happens, of a few isolated well-marked swings in the form of peaks on the photo-

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graphic records of all the elements. One occurred between 10.30 and 11.25 p.m. on the declination, the magnet swinging east, and the range being 38′. This was preceded at 11.5 p.m. by an increase of H.F. of 31′. A second peak was recorded on this element at 1.45 a.m. on June 18, the force decreasing by 11′. A small decrease of V.F. accompanied this movement of the H.F.

The sun's surface, though disturbed, had been almost free from spots between June 5–11. But from June 12, when a group of spots appeared in bright faculæ at the east limit, and almost on the sun's equator, the solar surface became very active with spots, bright faculæ, pores, and drifts of granulations. Individually the spots were not very large, but on June 17–18 there were no fewer than seven groups of spots visible, all displaying considerable changes of form. In particular there were two sympathetic groups, one, already referred to, extending in latitude from $+1\cdot5^\circ$ to $+4^\circ$, and in mean longitude 35°, and the other in latitude -17° and longitude 46°. The whole region of the sun between these two groups was very active, the faculæ being visible even at the centre of the disc, with streams of granulations connecting the two groups. On June 17 the southern group passed the central meridian, and the northern group on June 18. The heliographic latitude of this northern group was almost exactly that of the earth as projected on the sun, so that on June 18 the spot group and the earth were radially opposite one another. Such a close approximation of the position of the spot and the earth referred to the sun's central meridian during a magnetic storm is very unusual. It certainly has not occurred in any violent magnetic storm since the year 1898.

A. L. Cortie.

Stonyhurst College Observatory, June 20.

Man's True Thermal Environment.

Following Dr. Hill's article on healthy atmospheres in Nature of April 22, a letter appeared in Nature of May 6 under the above heading, which suggests that too narrow a view has been taken of this important subject. Dr. Milne writes from a place where man exists in spite of the climate, and no doubt the robustness of the local race is largely due to generations of selection under rigorous conditions that are only overcome with the aid of ponderous clothing and heated dwellings. At the outset we should inquire as to the thermal conditions that existed at the birth of our race. No doubt man soon learnt to keep himself warm by artificial means, but he appeared first in association with a fauna almost tropical in character. It is in tropical regions that our race exists to-day in comfort with little or no protection and in spite of many adverse organisms that are also favoured by warmth.

What results would Dr. Milne's psuchrainometer give us in these places? For it is of importance if figures of any value are to be obtained that the methods should be generally applicable to habitable regions. It is not remarkable that methods bred in an extreme climate must fail in quite congenial regions but where the air temperature is often over 38° C. and sometimes exceeds 45° C. Here, no doubt, Dr. Milne's ingenuity would produce a metapsuchrainometer to tell us what heat must be taken from a body to keep it at blood-heat. We should be the richer for a valuable device, but our knowledge of man's true environment would not be much advanced.

Meteorologists have succeeded very well in obscuring the significance of the wet-bulb temperatures by wrapping them up in terms of relative humidity. The relation of the dry- and wet-bulb reading, besides giving us the potential cooling power of the atmosphere as it affects a moist surface, enables us to arrive at the absolute humidity and the specific heat of the air. This last factor no doubt varies considerably with the moisture content, and must be of importance in the convection affecting the heated body of the psuchrainometer.

Dr. Milne's ψ only takes into account the air temperature, specific heat and velocity, provided radiation effects are constant. It cannot be taken to represent the whole environmental effect, which depends also on the power of the air to take up moisture. The katathermometer figures appear most promising in this respect, but the present form of instrument is probably not completely suitable for hot climates.

G. W. Grabham.

Khartoum, May 26.

A Continuous Spectrum in the Ultra-Violet.

The following observation may be of interest in connection with Prof. E. P. Lewis's letter in Nature of June 10.

During some recent experiments which I carried out in the Cavendish Laboratory, it was observed that the radiation coming from the gas in the path of the discharge between a Wehnelt kathode and an iron anode was rich in ultra-violet light. The strength of the discharge current was between one and two amperes. With air in the bulb and the pressure reduced as low as possible with a Geryk pump, the spectrum, which was photographed with a small Hilger quartz spectrograph, showed the nitrogen bands and the mercury line $\lambda 2536$. As the pressure was increased by admitting a small quantity of hydrogen a continuous spectrum made its appearance, the mercury line increasing in intensity relatively to the bands. By washing out the bulb several times with hydrogen and removing the air by means of charcoal and liquid air, a continuous spectrum was obtained which showed no signs of the bands and lines. The spectrum extended beyond $\lambda 2000$ and gradually faded away, due to the absorption in the spectrograph. The pressure of the hydrogen in the bulb was about 2 mm.

It is thought that this continuous spectrum is the result of the bombardment of the hydrogen molecules by slow-moving electrons, the energy of which is not sufficient to produce ionisation in hydrogen. Further experiments are necessary to test this idea, and I hope to be able to carry them out on my return to America.

James Barnes.

The University, Manchester, June 19.

The Names of Physical Units.

To all who are interested in the improvement of scientific nomenclature the points raised by Dr. Guillaume's letter (Nature, June 17, p. 427) are of great importance. In my opinion the case for rational nomenclature has been stated with both logic and humour by Dr. Guillaume, while Dr. Harker's reply seems to show misapprehension of the main point. All good nomenclature should be unambiguous, and, if possible, self-explanatory. The terms *masse volumique, volume massique,* and *stéradian* have both these desirable qualities; no one with a knowledge of physics and French could make any mistake as to the exact meaning of the first two, and the meaning of the third should be at once self-evident to anyone who knows the definition of a solid angle. I should not expect a chemist or a botanist to have anything but a hazy idea of the meaning of *puissance massique,* but even to an ordinary French engineer it should convey its meaning instantly.

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